

Introduction to Cankers and Overview of Aspen Cankers

Diseases of the cambium and bark

Cankers are diseases of the bark. They differ from wounds in that the cause, usually a fungus, remains active for some time, causing progressive expansion of the lesion over time. Where the cambium and inner bark die, the sapwood beneath also dies. If a canker grows all the way around a stem or branch, it is said to be girdled, and everything distal to the girdle dies. Branches fade and die (branch flagging) after girdling. Diffuse cankers continue to grow, and the tree does not have time to produce callus. Target cankers grow short distances periodically, and the host produces callus each year in an expanding concentric pattern.

Canker impacts include: deformation of stem growth, leading to loss of wood value and a weak point that may snap; creation of infection court for wood-decay fungi; and mortality.

Some diseases include canker development as one of their symptoms but are classified primarily as other disease types. This group includes some stem-decay fungi that may come to the surface and kill cambium and bark (canker-rots) and some rusts and mistletoes.

Aspen Cankers—Aspen has more important canker diseases than any other tree species in the Rocky Mountain Region (figs. 1-5). Descriptions of the most important ones are available, but here we provide an overview and guide to identification of the aspen cankers common in the Rocky Mountains.

Sooty-bark canker is the most widespread, damaging canker of aspen in Colorado and probably other Rocky Mountain states. Typically, sooty-bark canker kills more mature aspen trees than any other agent (this is not the case during unusual episodes of aspen mortality such as from 2004 to 2009). In surveys, sooty-bark canker was responsible for 55% of mortality. Next in importance is *Cryptosphaeria* canker, causing 26% of mortality. Black canker is probably next most common but usually does not directly kill trees. *Cytospora* canker is quite common, but attributing mortality to it is more problematic because it is frequently associated with stress caused by other diseases and factors.

Identification—Generally, well-developed cankers have sufficiently distinct features that they can be readily identified in the field. However, small, young cankers often do not have all the typical features and can be difficult to identify. Following are brief descriptions that should enable identification using distinguishing features that are usually available in well-developed cankers. A more detailed comparison is presented in table 7.

- *Sooty-bark canker*: cankers expand rapidly so that callus formation is rare; alternating, concentric zones of light and dark where the periderm remains present versus where it falls off, revealing the sooty black inner bark; small ($1/25$ - $1/13$ inch [1-2 mm] in diameter) light gray, usually shriveled, cup-shaped fruiting bodies (fig. 1).
- *Cryptosphaeria canker*: cankers become very long and narrow with orange-brown margins; inner bark becomes black but usually has small ($1/50$ - $1/13$ inch [0.5-2.0 mm]) whitish lenticular spots; black, pimple-like fruiting bodies may be peppered on the dead bark in patches (fig. 2).



Figure 1. Typical sooty-bark canker on aspen (from Johnson and others 1995).



Figure 2. Typical *Cryptosphaeria* canker on aspen. Photo: Jim Worrall, USDA Forest Service.

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Table 7. Comparison of aspen cankers.

	Canker type	Surface appearance	Fruiting	Mortality
Sooty-bark	Diffuse canker; grows rapidly	Alternating zones with periderm present versus exposed; black inner bark	Gray, cup-shaped; shriveled, 1/64-1/16 inch (0.5-2 mm) diameter common	Primary killer
Cryptosphaeria	Perennial target or diffuse; grows much faster longitudinally than tangentially	Long, narrow canker, dead bark adheres tightly; margin is orange-brown	Pimple-like, black heads with submerged pseudostroma; common	Primary killer
Black trees	Perennial target canker; grows slowly	Bark sloughs off and/or flares out; concentric annual callus ridges in wood are exposed	Minute, black perithecia in spring; rarely seen	Usually does not directly kill
Cytospora stressed	Diffuse canker; grows rapidly on severely stressed trees	Orange discoloration at margin; bleeding, especially in spring	Pimple-like, often with white heads; common	Secondary killer; attacks trees
Hypoxylon uncommon in	Diffuse canker	Irregular shape; dead bark sloughs off in patches leading to a checkered pattern, yellowish-orange margin	Gray conical pillars beneath blistered periderm; perithecia in small gray-black stromata	Primary killer but Rocky Mountains

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- *Black canker*: cankers are diamond-shaped or oval, often with flaring margins; bark usually sloughs off to expose wood at canker center; wood and especially bark at margins are often dark to black; concentric annual callus rings, often quite narrow, are visible on the wood surface (fig. 3).
- *Cytospora canker*: canker margins are discolored orange; bleeding of black liquid may be present, especially in spring; older dead bark is not much altered but may become brownish and shriveled or sunken; pimple-like fruiting, often with white heads, eventually appears in some spots (fig. 4).
- *Hypoxylon canker*: cankers often have irregular shape; salt-and-pepper checkered appearance; fruiting, especially the small, gray-black, bumpy stromata, is almost always present; this is the least common of the five cankers described here (fig. 5).



Figure 3. Typical black canker on aspen. Photo: Jim Worrall, USDA Forest Service.

Management—Because wounds are important infection courts for most of the canker pathogens, avoiding wounding is important, especially during the growing season. This is a major reason why partial cutting in aspen is strongly discouraged. It is also a major reason why developing campgrounds in aspen stands is strongly discouraged in Regional policy.

For timber management, information on the incidence and types of cankers in managed stands can be used in prioritizing stands for treatment. Trees can survive with black canker for many years, but most of the other cankers may be indicators of stands that are in the process of overstory mortality. *Cytospora* canker is usually evidence of some other stress factor at work.



Figure 4. Typical *Cytospora* canker on aspen. Photo: Jim Worrall, USDA Forest Service.



Figure 5. Example of *Hypoxylon* canker on aspen. Photo: Rocky Mountain Region Archive, USDA Forest Service, Bugwood.org.

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